positioning the pair of substrates, in opposed relationship and separated by a discharge space of a predetermined interval therebetween, in a vacuum-heating furnace;

exhausting the discharge space between the pair of opposed substrates via a leak clearance between the seal glass layer and the substrate until said seal glass layer begins melting, to produce a low pressure therein relative to an exterior pressure on the substrates; and

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heating said seal glass layer until said seal glass layer melts while maintaining the low pressure in the discharge space by said exhausting.

REMARKS

In accordance with the foregoing, the specification has been amended in accordance with the attached AMENDED SPECIFICATION and applicants furthermore submit herewith a SUBSTITUTE SPECIFICATION, incorporating the amendments of the AMENDED SPECIFICATION.

Further, the pending claims 1-26 have been amended and new claims 27-30 have been added.

In addition, a Letter to the Examiner Requesting Approval of Changes in the Drawings is filed concurrently, placing the drawings in conformance with the Rules and/or with designations in the specification.

No new matter is presented in any of the foregoing.

Approval and entry of the AMENDED and SUBSTITUTE SPECIFICATIONS, amended and new claims, and drawing changes are respectfully requested.

ITEMS 1-3 OF ACTION: OBJECTIONS TO SPECIFICATION AND REJECTION OF CLAIMS UNDER 35 USC § 112, ¶ 2 FOR INDEFINITENESS

The foregoing AMENDED and SUBSTITUTE SPECIFICATIONS and the amendments to the claims are submitted to overcome the objections and rejections of items 1-3.

The Examiner's careful review of the specification and claims and helpful suggestions

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for improving same are acknowledged and greatly appreciated.

STATUS OF CLAIMS

ITEM 5: REJECTION OF CLAIMS 1-4, 11, 12 AND 14 UNDER 35 USC § 103(a) FOR OBVIOUSNESS OVER TANAKA IN VIEW OF TADASHI ET AL. OR NAGANO ET AL. AND KIMURA

ITEM 6: REJECTION OF CLAIMS 6 AND 9 UNDER 35 USC § 103(a) FOR OBVIOUSNESS OVER THE COMBINATION OF REFERENCES IN ITEM 5 TAKEN FURTHER IN VIEW OF ITOH ET AL.

ITEM 7: REJECTION OF CLAIM 8 UNDER 35 USC § 103(a) OVER THE REFERENCES TANAKA, NAGANO ET AL. AND KIMURA OF ITEM 5, TAKEN FURTHER IN VIEW OF KANAGAWA ET AL.

The foregoing rejections of items 5, 6 and 7 are respectfully traversed, for reasons set forth below.

ITEM 8: CLAIMS 5, 7, 10 AND 13 WOULD BE ALLOWABLE IF SUITABLY REWRITTEN TO INDEPENDENT FORM AND TO OVERCOME THE 35 USC § 112, ¶ 2 REJECTIONS, NOTED ABOVE.

ITEM 9: CLAIMS 15-26 WOULD BE ALLOWABLE IF REWRITTEN OR AMENDED TO OVERCOME THE REJECTIONS UNDER 35 USC § 112, ¶ 2, NOTED ABOVE.

Applicants appreciate the Examiner's indications of allowability of claims in accordance with items 8 and 9 of the Action. The designated claims of item 8 have been amended to overcome the § 112, ¶ 2 rejections, as above specified.

However, the designated claims of items 8 and 9 have not been rewritten to independent form since applicants submit that, in light of the following comments, the

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respective independent claims thereof are allowable over the art of record.

THE PRESENT INVENTION

Objects to be solved by the present invention are:

(1) to avoid breaking the substrates due to the stress caused by the conventional use of numerous clips for initially affixing the pair of front and back substrates in the manufacturing process for forming a plasma display panel, and to reduce the long time required by conventional sealing processes;

(2) to overcome the problem caused by non-uniformity of the clip pressure, such as local stresses whereby the substrates may be broken or may have insufficiently pressed portions, whereby the substrates may be incompletely sealed; and

(3) to overcome the problems of impurity removal from the discharge space via a conduction pipe, undesirably long exhausting periods and insufficient purity of the discharge space produced by conventional exhausting methods.

To solve, in particular, prior art problems (1) and (2), above, the present invention provides a method of manufacturing a PDP in which the sealing process for a pair of substrates comprises exhausting a discharge space between the pair of substrates, surrounded by a sealant (or sealant frame), so as to lower the pressure therein and establish a pressure differential relative to an exterior, or ambient, pressure on the outer surfaces of the substrates, and heating the sealant. In the sealing process, the sealant is melted by heating and the pair of substrates is pressed toward each other by a force produced by the pressure differential between the exterior of the substrates and the discharge space, compressing the sealant. Accordingly, the level of external mechanical force applied to the pair of substrates, such as by clips in conventional methods, may be minimized and the period required for sealing the pair of substrates is shortened.

Independent claims 1, 9 and 27 address these above basic processes.

Dependent claim 6/1 and claim 9 furthermore address a method for producing a plurality of PDP's from large substrates which, upon completion, are cut into smaller, individual substrates forming plural independent panels.

Claim 11 addresses the features of exhausting the discharge space to produce a low

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pressure therein, relative to an exterior pressure on the substrates, and heating the seal glass layer so as to melt same while maintaining the low pressure therein.

Claim 12 address the feature of using a leak-clearance between a seal-glass layer and the substrate, before the seal-glass layer has completely melted. This permits exhausting gas in the discharge space defined between the pair of substrates more easily and completely than when discharging only by using a conduction pipe, such as in the conventional structure and related manufacturing methods of Figs. 2A and 2B. This is because the leak-clearance extends effectively throughout the seal-glass layer along the periphery of at least one of the pair of substrates. As addressed in the last paragraph of claim 12, after the seal glass layer has melted and the leak clearance is sealed, exhausting continues through a conduction pipe.

ITEM 5 OF OFFICE ACTION: REJECTION OF CLAIMS 1-4, 11, 12 AND 14

These claims are rejected under 35 USC § 103(a) over Tanaka (USP 6,189,579) in view of Tadashi et al. (JP 9-251839), Nagano (USP 5,207,607, and Kimura (USP 5,997,379). It is noted that --Seki-- is the last name of the coinventor Tadashi Seki of JP 09/251839; however, the reference will be cited as Tadashi hereinafter to avoid confusion.

The rejections are respectfully traversed.

TANAKA (USP 6,189,579)

Tanaka discloses a method for removing impurities in a gas discharge panel and filling a gas into the panel, and in which method a pair of substrates comprising the panel are bonded to each other, as the Examiner states (Figs. 1, 3-7, and col. 5, lines 22-23 and 29-40, as cited in the Office Action at page 3, item 5). That, however, does not render Tanaka relevant to the claimed invention.

The Tanaka reference primarily relates to the provision of activated getters in a pipe connected through a substrate of and to an interior of a panel. The pipe is heated, thereby activating the getters, to remove impurity gases. The pipe also serves to fill a discharge gas into the panel. As such, the Tanaka reference is unrelated to the present invention.

Moreover, there is no description in the reference about sealing substrates in a state where the pressure in the space therebetween, and defined by substrates and a sealant frame,

is lower than a pressure surrounding the exterior of the panel, as recited in claims 1 and 9. Hence, Tanaka is irrelevant to the invention defined in those claims.

TADASHI (JP 09-251839)

The following is a translation of paragraphs [0016] - [0018] of the Tadashi reference.

> [0016] Next, the third embodiment is explained. Like the first embodiment described above, the vacuum level of the interior of furnace is held at the predetermined level. After completion of the exhaustion and degasifying from the both glass substrates A and B, the temperature in the furnace is raised higher to 400~500°C which is a melting temperature of the sealant. In a heating process during or after this process, discharge gases, such as neon gas, are introduced in the furnace (kiln) from the cylinder filled with a discharge gas by closing the changeover valve V_1 and opening the changeover valve V_4. After completion of the gas introduction into the furnace and heating both the glass substrates A and B, the front glass substrate A is pressed to be stacked on the back glass substrate B as described above. During this stacking process, both the glass substrates are formed into a panel by pressing each onto the other, and at same time the discharge gases are sealed. In this case, the chip tube 21 and the piping 12, etc., are unnecessary.
>
> [0017] In addition, since the temperature of the discharge gas is high, it is preferable that the pressure of the gas is higher than one of a finished pressure (the pressure at room temperature), for example the pressure of the gas is about 2.4 times higher than at room temperature (see FIG. 5). After the discharge gases are sealed in the panel as described above, the panel is cooled at the cooling rate of 1~10°C per minute.
>
> [0018] Moreover, in the third embodiment it is preferable that both the glass substrates A and B are supported as shown in Fig. 3 with supporting members 22 having a melting point higher than the sealant melting temperature. The supporting members 22 are, for example, low melting temperature glass made from a slightly modified composition. The supporting members 22 are melted during the sealing process (400-500°C) to seal both the glass substrates A and B for making the panel. After this process, the interior pressure of the furnace is raised to a higher pressure than that of the interior of the panel so as to press the glass substrates A and B to each other and at the same time the discharge gas is introduced into the panel. In this case, each setter 3, which is included in the installation device 1, for the back glass substrate should be mounted slidably to the slide guide 2. Furthermore, although batch processing is explained with each embodiment, a glass substrate can be located in a muffle to

convey the muffle continuously or intermittently in a furnace.

Thus, in Tadashi, the discharge gases to be sealed in the panel are not introduced via a pipe, a through hole or the like (paragraph 16, lines 9-10) but are introduced within the furnace during the step of joining the substrates by pressure applied on the back glass substrate B; further, the pressure on the back glass-substrate is not caused by exhausting the discharge space between the substrates, as in the present invention, but, instead, by raising the interior gas pressure of the furnace and thus surrounding, i.e., on the exterior of, the panel. Accordingly, it is necessary to fill the kiln with discharge gases to fill the panel. Furthermore, this process raises the possibility that the discharge gas in the discharge space includes impurities from the sealing agent and within the furnace, because the gases are confined during heating of the sealing agent. These impurities are liable to decrease the operating performance, or degrade the characteristics of, the PDP as a display.

NAGANO (USP 5,207,607)

In the Nagano reference, an assembled panel 1 having an opened port 2, providing communication with the interior of the panel 1, is placed in a vacuum tank 21 which is then evacuated and heater 22 is turned on to heat the assembly to a degassing temperature. In more detail, Fig. 8 illustrates a cross section of the assembled panel and the particular feature of the reference of a blocking rod 27 affixed to the substrate 3 and extending through the port 2. The blocking rod 27 remains undeformed at the level of temperature required for degassing.

When a sufficient vacuum degree has been reached, the evacuation is discontinued and a discharge gas is introduced into the tank 21 thereby to fill the assembly, as shown in Fig. 9. (Col. 4, lines 38-46)

The assembly then is heated to a temperature sufficient to melt the block rod 27, which then softens and undergoes deformation by virtue of its own surface tension, the rod 27 diffusing within the port 2 and closing/sealing same, as shown in Fig. 10. The tank 21 then is cooled and the completed plasma display panel, filled with the discharge gas, is removed from the tank 21.

Col. 7, lines 14-24 address the function of softening and diffusion of the blocking rod

(tablet) 28, noting that the function may be supplemented by the weight of the back panel member 1 or an external force applied to it and also by raising the pressure of the gas around the panel 1 while in the tank 21 so as to "develop a pressure difference between the inside and outside of the enclosure to bring the two panel members 1 and 3 closer to each other with the softened blocking material 28 sandwiched therebetween." (Col. 7, lines 20-24)

Generally speaking, a PDP produced by the Nagano method will suffer from the same problems as one produced by the Tadashi method. More particularly, Nagano teaches the use of a vacuum tank 21 (Fig. 6) into which a discharge gas from bottle 25 is introduced through a valve 29_1. (See col. 6, lines 48-51) This creates the defect that contaminants and other impurities within the vacuum tank 21 may be introduced into the discharge space between the substrates which together form the panel 1.

Thus, the suggestion of raising "the pressure of the gas around the enclosure in the tank and thereby develop a pressure difference between the inside and outside of the enclosure to bring the two panel members 1 and 3 closer to each other..." is not at all the equivalent of the teaching of the present invention, as claimed, of lowering a pressure in the discharge space between the pair of substrates, relatively to a pressure on an exterior of the pair of substrates, by exhausting the discharge space...", following which a sealant between the pair of substrates is solidified and any impurity in the discharge space is removed; thereafter, discharge gas is filled into the discharge space.

EXAMINER'S COMMENT ON TADASHI AND NAGANO

The Examiner's characterizations of the teachings of both Nagano and Tadashi et al. are questioned; specifically, the Examiner asserts:

> each teach making the space between the substrates precise (default value) by raising the pressure... of the vacuum furnace at the time of sealing the two panel substrates together.

(Action at page 3, item 5) Applicants respectfully request that the Examiner clarify the above assertion, particularly as to the words "precise (default value)".

Aside from being a rather confusing statement, the Examiner's comment does not address a pressure differential, and thus it is not clear how the alleged teaching in the Nagano and Tadashi et al. references, as characterized by the Examiner, of "raising the pressure of the

vacuum furnace..." is relevant to the invention as claimed herein.

It is respectfully submitted that the reference is unrelated to the claimed invention, of reducing the pressure within the discharge space while maintaining the ambient pressure in a furnace to produce a pressure differential and a resultant mechanical force on the exteriors of the opposed substrates, urging same into a fixed relationship.

KIMURA (USP 5,997,379)

Kimura discloses placing assembled components of a display panel in a flexible gas tight enclosure 14. (See col. 5, lines 32-39 and col. 6, lines 2-3, only the latter specifying the "flexible gas tight enclosure 14.") The enclosure 14 then is evacuated and, in that state, ultraviolet rays are irradiated so as to harden the sealant 7, thereby bonding the front substrate 2 and an intermediate substrate 8 to each other. Further, a liquid crystal 12 is injected into the gap prescribed by spacer particles 10 between the front substrate 2 and the intermediate substrate 8 thereby to produce a liquid crystal cell. (Col. 5, lines 20-30)

Although the reference is not entirely clear, it appears that in Fig. 2, the evacuation of the interior of the flexible gas tight enclosure 14, as well, evacuates air from the gap between the intermediate substrate 8 and the front substrate 2, causing pressure -- as indicated by large arrows from the top and bottom in Fig. 2 -- to be exerted on the stacked elements (which directly engage the remote planar surfaces of the upper substrate 2 and the lower substrate 4), and following which the sealant 7 surrounding the gap is heated by the ultraviolet rays to melt and then is cooled to seal the liquid crystal material within the gap.

Kimura thus does not selectively exhaust the interior of the panel 13 but, instead, exhausts the exterior space surrounding the panel, as disposed within the flexible gas tight enclosure 14. The outer surfaces of the flexible enclosure 14 are then subjected to atmospheric pressure, producing a mechanical force on the exterior surfaces of the substrates 2 and 4, to force same together. Accordingly, while the reference uses a differential pressure effect, it is applied to the walls of the flexible gas tight enclosure 14 which, in turn, imposes a mechanical force directly on the outer surfaces of substrates 2 and 4.

Kimura thus operates on a very different principle than that by which the present invention functions.

At page 4, lines 3-9 the Examiner asserts that it would have been obvious to begin the

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evacuation step at the same time as the sealing process to provide a pressure differential, as suggested by Kimura. The Examiner's comment is respectfully traversed.

As described above, Kimura does not disclose evacuating the inside space of a panel. Instead, Kimura evacuates the space within a flexible enclosure 14 which, due to the pressure differential established relatively to the exterior of the flexible enclosure 14, causes a force to be exerted by the enclosure 14 on the exterior surfaces of the substrates of the panel, thereby to urge the substrates toward each other while melting a sealant which is compressed by the substrate. It is significant in this regard that Kimura does not teach establishing a differential pressure between the discharge space defined between the substrates (i.e., within the interior of the substrates), and the ambient pressure acting on the exterior of the substrates.

ABSENCE OF ANY *PRIMA FACIE* OBVIOUSNESS DEMONSTRATION

Applicants respectfully submit that the proposed combination of prior art references is not supported by any *prima facie* demonstration of obviousness -- and, it is submitted, none exists. Some of the references of the purported combination teach increasing pressure uniformly within both the interior and the exterior of a panel held in a vacuum chamber while others teach exhausting the interior of a vacuum chamber -- i.e., diametrically opposed steps, for which the Examiner has offered no explanation of the *prima facie* obviousness of combining same into a single process, and which are respectfully submitted to be self-evidently incompatible and necessarily impossible to combine.

The invention, as claimed, moreover, affords decreased processing time in the fabrication of panels. As described in paragraphs 0019-0020 of the application, in the prior art, a weak clipping pressure produced by clips is used for pressing the sealant. As the force is weak so as to avoid breaking the glass substrates, the processing time for sealing is longer than that of the present invention, because the time for deforming the sealant takes longer than that of the present invention. In the present invention, the pressure produced by the pressure difference between the interior and exterior of the discharge space is applied uniformly over the substrates; hence, a large pressure and corresponding force is applied uniformly over the substrates with the less fear of breaking the substrates -- reducing the processing time.

Accordingly, the present invention affords numerous advantages neither capable of being afforded by the references of record and/or neither disclosed nor suggested thereby.

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It is respectfully submitted that the basic prior art combination relied upon is defective and should be withdrawn.

ITEM 6: REJECTION OF CLAIMS 6 AND 9 FOR OBVIOUSNESS UNDER 35 USC § 103(a) OVER THE REFERENCES OF ITEM 5 TAKEN FURTHER WITH ITOH ET AL.

These rejections are respectfully traversed.

Itoh et al., as noted, merely teaches a process step of dividing a larger set of substrates into smaller substrates connected to form a plurality of display panels. The teaching of Ito does not overcome the basic inadequacies of the combination relied upon in item 5 and, hence, the rejection of claims 6 and 9 in item 6 should be withdrawn.

ITEM 7: REJECTION OF CLAIM 8 FOR OBVIOUSNESS UNDER 35 USC § 103(a) OVER TANAKA, NAGANO AND KIMURA AS APPLIED TO CLAIM 1 IN ITEM 5 OF THE ACTION TAKEN FURTHER IN VIEW OF KANAGAWA ET AL.

The present application acknowledges the known use of fixing clips and Kanagawa et al. thus is merely a redundant prior art teaching thereof -- and, moreover, is a "teaching-away" from the present invention, which seeks to minimize the use of such clips. Kanagawa et al. does not overcome the inadequacies of the basic combination relied upon and accordingly the rejection of claim 8 in item 7 should be withdrawn.

NEW CLAIMS 27 AND 30

New independent claims 27 and 30, as in independent claims 1,9, and others, all set forth a basic function of exhausting a discharge space, defined between a pair of substrates and surrounded by a sealant, to as to produce a pressure differential relative to an exterior, or ambient, pressure on the outer surfaces of the substrates and heating, and thereby melting, the sealant, the pressure differential establishing forces pressing the substrates toward each other and compressing the sealant. Thereafter, the substrates are cooled, the sealant hardens, and discharge gas is introduced into the discharge space. The panels are ultimately sealed to complete the process.

In item 5 of the Action, claims 1-4, 11, 12 and 14 are rejected on the grounds set forth above; it is assumed that the Examiner would have rejected new independent claims 27 and 30

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on the same grounds, had they been pending at the time and accordingly claims 27 and 30 are included herein, as well. The rejections are respectfully traversed.

The Examiner relies on Tanaka relative to removal of impurities and filling of gas into a previously sealed display device.

For the reasons discussed above, Tanaka is submitted to be irrelevant to the present invention. Tanaka relates to using getters to remove impurity gases and has no relationship to the differential pressure effect employed in the present invention.

The Tadashi and Nagano references, as discussed above, are equally unrelated to the present invention since these both are directed to placing substrates of a panel with a sealant therebetween, surrounding a discharge space, within a vacuum chamber or other enclosure and then increasing gas pressure within the enclosure. In short, there is no teaching of evacuating the discharge space in the interior of the panel to create a pressure differential, in accordance with the present invention, as claimed.

As also above noted, the Tadashi and Nagano processes are intended to be carried out in an atmosphere of a discharge gas within a vacuum chamber or other enclosure, and the sealing and discharge gas introducing steps are processed at the same time. As above explained, this raises problems of contamination of the discharge gas, since having to flow throughout the vacuum chamber or other enclosure to flow into and fill the discharge space between the substrates.

Accordingly, the process of the present invention as recited in claims 1, 9, 27 and 30 is not obvious in view of or suggested by any of the Tanaka, Tadashi and Nagano references, taken singly or in any proper combination.

CONCLUSION

In accordance with the foregoing, it is respectfully submitted that the pending claims patentably distinguish over the art of record, taken in any proper combination. There being no other objections or rejections, it is submitted that the application is in condition for allowance, which action is earnestly solicited.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: October 22, 2001

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CERTIFICATE UNDER 37 CFR 1.8(a)

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on Oct 22, 20 01

STASS & HALSEY

By: [signature]

Date: 10-22-01

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Please correct the specification in accordance with the attached AMENDED SPECIFICATION and with respect to which there further is attached a SUBSTITUTE SPECIFICATION, entering the amendments of the AMENDED SPECIFICATION.

IN THE CLAIMS:

Please AMEND the following claims:

1. (ONCE AMENDED) A [manufacturing] method of manufacturing a gas discharge panel having a pair of substrates sealed together with a sealant and defining a discharge space [in between a pair of substrates sealed together with a sealant] therebetween, comprising [sequentially the steps of]:

[a first step to form] forming the sealant in a frame-shape on at least one of the pair of substrates, and [to stack] stacking said substrates, one upon the other [onto another substrate] via the sealant;

[a second step to lower] lowering a pressure in [a] the discharge space [existing] between the pair of substrates, relatively to a pressure on an exterior of the pair of substrates, by exhausting the discharge space [and within the sealant], while heating and thereby melting the sealant [is melt by being heated];

[a third step to solidify] solidifying the sealant so as to fixedly join the pair of [the] substrates [as well to form a predetermined] with the discharge space therebetween;

[a fourth step to remove] removing an impurity in the discharge space; and

[a fifth step to fill] filling a discharge gas into the discharge space.

2. (ONCE AMENDED) A [manufacturing] method of manufacturing a gas discharge panel as recited in claim 1, wherein [in the second step] the lowering of the pressure further comprises:

[an] exhausting [of] the discharge space [is begun] when the sealant reaches a predetermined melting temperature thereof [,] ; and

pressing the sealant [is pressed] by [holding] establishing a predetermined low pressure in the discharge space so as to define a gap between the pair of the substrates.

3. (ONCE AMENDED) [The manufacturing] A method of manufacturing a gas discharge panel as recited in claim 1, wherein, in the second step, the [a] exhausting [process] of the discharge space for lowering [a] the pressure in [a] the discharge space [in] between the substrates and [a] the heating [process] for melting the sealant are begun simultaneously.

4. (ONCE AMENDED) A [manufacturing] method of manufacturing a gas discharge panel as recited in [either one of] claim 1 [to claim 3], [wherein in the second step are provided] further comprising:

providing separator walls [for defining the discharge space] on at least one of the substrates, a height of [so that] said separator walls [define said gap] defining a height of the discharge space when the pair of substrates [press] compresses the sealant.

5. (ONCE AMENDED) A [manufacturing] method of manufacturing a gas discharge panel as recited in [either one of] claim 1 [to claim 4], wherein a non-continuous barrier wall is provided beforehand in a vicinity of [inside] an interior of the sealant so as to prevent an inward invasion of the [sealant] melted sealant.

6. (ONCE AMENDED) A [manufacturing] method of manufacturing a gas discharge panel as recited in [either one of] claim 1 [to claim 5], wherein:

[in said first step] the forming of the sealant further comprising forming a plurality of said frame-shaped sealants [is formed of a plurality of frames thereof] on said one of said substrates; and

[said steps 2 to 5 are carried] carrying out the lowering, solidifying, removing and filling for said plurality of ac-shaped sealants [frames] and [for a] respective plurality of discharge spaces formed within said [frames] frame-shaped sealants.

7. (ONCE AMENDED) A [manufacturing] method of manufacturing a gas discharge panel as recited in claim 6, wherein [each of] said plurality of discharge spaces [formed of said sealant frame is] are provided with [a] respective through holes in [the] adjacent a relationship [vicinity where each of portions of adjacent said spaces gathers;] , so that said exhausting and said discharge gas filling processes are carried out via a pipe connected commonly to each of the respective through holes.

8. (ONCE AMENDED) A [manufacturing] method of manufacturing a gas discharge panel as recited in [either one of] claim 1 [to claim 7], wherein [in said first step] peripheral portions of said pair of substrates are pinched together with [tentatively] temporary fixing clips.

9. (ONCE AMENDED) A [manufacturing] method of [a] manufacturing plural gas discharge panels, each having a respective discharge space, [in] between a pair of substrates, each panel sealed together with [of] a sealant frame, comprising [sequentially] the steps of :

[a first step to form] forming a plurality of [the] sealant [each in a shape of] frames, [at least] on a first surface of a first substrate opposing [to another] a second substrate[,] and [to] stacking said first substrate onto [another] said second substrate via [a] the plurality of [the] sealant frames, wherein each of the substrates [is formed of parts for composing the panels within each of reigns which are defined by] has a plurality of cutting lines defining the plural gas discharge panels, [and each of the shapes] formed with [the] respective sealant frames [is formed] so as to enclose [a corresponding reign] respective discharge spaces;

[a second step to] lowering are internal [each of] pressure[s in a] of each of the plurality of discharge spaces [formed in between the pair of substrates due to the existence of the plurality of sealant] relatively to a pressure on an exterior of each of the pair of substrates so as to press [over the surfaces of] the pair of the substrates together and to fix a [gap] size of the discharge spaces between the pair of the substrates [while] and heating and thereby melting the plurality of sealant [is melt by being heated] frames;

[a third step to solidify] solidifying the plurality of [the] sealant frames, once [being] melted, so as to fix the pair of the substrates [as well to] and form the plurality of discharge spaces [in] between the pair of substrates;

[a fourth step to remove an impurity] removing impurities in the discharge spaces;

[a fifth step to fill] filling a discharge gas into the discharge spaces and sealing the discharge spaces; and

[a sixth step to cut] cutting the pair of the substrates along the cutting lines into a plurality of smaller substrates so as to form a plurality of [smaller] individual said gas discharge panels.

10. (ONCE AMENDED) [The manufacturing] A method of manufacturing a gas discharge panel as recited in 9, wherein [each of] said plurality of discharge spaces [formed of

said sealant frame is] are provided with a plurality of respective conduction pipes in [a portion, said portions each are in a vicinity and in each of] adjacent [space] relative positions to each other, each extending from an exterior of a respective gas discharge panel to the respective discharge space thereof, and so that said exhausting and said discharge gas filling processes are carried out via a pipe connected commonly to [each] the plurality of conduction pipes.

11. (ONCE AMENDED) A [manufacturing] method of manufacturing a gas discharge panel [provided with] comprising a [sealed] pair of substrates [opposing] opposed to each other, one of the substrates having a plurality of electrodes on a inner surface thereof so as to produce a discharge with adjacent electrodes[,] and the [an]other of the substrates having on an inner surface thereof fluorescent materials of a plurality of different colors [kinds] for emitting fluorescences stimulated by the discharges and a plurality of separator walls formed [of] in a predetermined pattern [so as to separate] separating said fluorescent materials, comprising [of a step: a step for sealing said pair of the substrates, wherein said step includes]:

[a first process to form] forming a [sealant at] seal glass layer along a periphery of the other substrate, of a height greater [higher] than [that] a height of said separator walls[,] ;

positioning the pair of substrates, in opposed relationship and separated by a discharge space of a predetermined interval therebetween, in a vacuum-heating furnace;

[a second process to exhaust a gap in] exhausting the discharge space between the pair of [the] opposed substrates [opposing each other till a beginning of said sealant melting,]; and

[in turn a third process to heat] heating said [sealant till] said seal glass layer until said seal glass layer [sealant to be melt] melts while [the gap is hold in] maintaining the low [-] pressure [therein] in the discharge space by said exhausting.

12. (ONCE AMENDED) A [manufacturing] method of manufacturing a gas discharge panel [having] comprising a pair of substrates [sealed at a periphery thereof, said pair of substrates] having [a plurality] respective pluralities of electrodes [on each substrates and] thereon and being disposed in opposing [to each other via] relationship with a [predetermined] discharge space therebetween, comprising [the steps of] :

forming a seal-glass layer along a periphery of one of the substrates;

positioning the pair of substrates, in opposed relationship and separated by a discharge space of a predetermined interval therebetween, in a vacuum-heating furnace;

[a first step to exhaust] exhausting said discharge space via a leak clearance between [a] the seal-glass layer and the substrate while [an inner space of the] disposed with a furnace [is kept at] and which maintains a predetermined temperature[, wherein said seal-glass layer is formed on a periphery of one of the substrates, said each of the substrates being kept at predetermined interval therebetween is held in a vacuum-heating furnace] within the furnace; and

[a second step to seal said pair of the substrates during] lowering [a] the pressure in [an opposition-space in] the discharge space between the pair of the substrates by exhausting same via a conduction pipe, connected to a through hole previously provided in a portion of the [an]other substrate, while the temperature [in the inner of] within the furnace [raises] is raised to a melting temperature of said seal-glass layer to seal the substrates.

13. (ONCE AMENDED) The [manufacturing] method of manufacturing a gas discharge panel as recited in claim 12, wherein a pressure [around said] within the furnace and exterior of the pair of [the] substrates is raised [once] at least once [in process of said] after lowering [a] the pressure [around the pair] exterior of the pair of substrates before melting [of] said seal-glass layer.

14. (ONCE AMENDED) The [manufacturing] method of manufacturing a gas discharge panel as recited in claim 12, [wherein said] further comprising lowering the pressure via a seal-head connected to the conduction pipe.

15. (ONCE AMENDED) A [manufacturing] method of manufacturing a gas discharge panel[, said panel having a sealant and] comprising a pair of substrates defining a discharge space therebetween and having a plurality of separator walls [so as to keep a discharge space] on at least one of [a] the pair of substrates [and the pair of the substrates being sealed by the sealant], comprising [sequentially steps of]:

[a first step to form] forming a [frame-shape] sealant in the shape of a frame on one [at least] of the pair of substrates[, and to]

stacking the one substrate onto [another] the other substrate;

[a second step to arrange] arranging a formed- glass-frit in a vicinity of and aligned with a through hole [provided to one at least] in one of the substrates;

[a third step to heat] heating the pair of [the] substrates so as to raise a temperature of

the pair of [the] substrates [by heating,] and [to exhaust a] exhausting gas from, and lowering a pressure [around] in, a space surrounding the pair of the substrates so as to remove [a impurity] any impurities in [a] the discharge space [in] between the substrates;

[a fourth step to melt] melting the sealant;

[a fifth step to form] forming said discharge space [in] to a height determined by [that] a height of the separator walls [due to] by deforming the sealant;

[a sixth step to cool] cooling the pair of the substrates so as to solidify the sealant;

[a seventh step to fill] filling the discharge space with a discharge gas introduced through the through hole in the panel; and

[a eighth step to seal] sealing the through hole [used for] after filling the discharge space with the discharge gas [into the discharge space].

16. (ONCE AMENDED) The [manufacturing] method of manufacturing a gas discharge panel as recited in claim 15[,] wherein [in the first step a height of] the sealant frame is formed [higher] of a height greater than [that] a height of the separator walls, clips for pinching and [fixing said] affixing the pair of [the] stacked substrates are located so as to press together respective central portions of the substrates within a vicinity of regions where the separator walls are to engage the other substrate, [and the discharge space is formed via each step from the first to fifth steps being carried out while the sealant is applied with a force due to bending of the substrates] , bending the central portions of the substrates in an inward direction toward the discharge space relatively to the peripheries thereof, spaced apart by the sealant frame.

17. (ONCE AMENDED) The [manufacturing] method of manufacturing a gas discharge panel as recited in claim 15[,] wherein in the fifth step] the deforming of the sealant is caused by a force produced in a direction toward the discharge space from an exterior of both of [around] the pair of [the] substrates [due to] by maintaining a pressure [around] in the exterior of the pair of [the] substrates [being kept] higher than [that] a pressure in the discharge space between the substrates.

18. (ONCE AMENDED) The [manufacturing] method of manufacturing a gas discharge panel as recited in claim 15[,] wherein [in the fifth step is closed] the height of the discharge space is determined by closing a portion [in] of a conduction path, from the discharge

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space to the exterior of the pair of the substrates, so as to provide a uniform pressure-difference between [the] a lower pressure in the discharge space between the substrates and [that in] a relatively higher pressure on the exterior of the pair of the substrates.

19. (ONCE AMENDED) The[manufacturing] method of manufacturing a gas discharge panel as recited in claim 15, [wherein in the third step an] , further comprising, while heating the pair of substrates, exhausting [of an exterior around] gas from the exterior of the pair of the substrates [is begun] when the sealant reaches a vicinity of a temperature at which [a] degassing becomes active and is ended when the sealant [sticks] adheres to the substrate.

20. (ONCE AMENDED) The [manufacturing] method of manufacturing a gas discharge panel as recited in claim 15, wherein a conduction pipe is connected to the through hole, [and] a seal-head [available] operable to exhaust the discharge space via the conduction pipe is connected to the conduction pipe, and [an] exhausting the discharge space is carried out via the conduction pipe and the seal-head after the sealant [sticking] adheres to the substrate.

21. (ONCE AMENDED) The [manufacturing] method of manufacturing a gas discharge panel as recited in claim 15, wherein, while melting the sealant, raising [in the fourth step] the pressure [around] in the exterior of the pair of [the] substrates [is raised] to a level of pressure at which a bubble existing in [a] the sealant does not [grow bigger] increase in size.

22. (ONCE AMENDED) The [manufacturing] method of manufacturing a gas discharge panel as recited in claim 20, wherein, after the sealant adheres to the substrate, the pressure [around the pair] on the exterior of the pair of substrates is raised to a level of a pressure at which a bubble existing in a sealant does not [grow bigger] increase in size.

23. (ONCE AMENDED) The [manufacturing] method of manufacturing a gas discharge display panel as recited in 15, wherein, in the fourth step, the sealant is melted [in] at a temperature below a [beginning of] temperature at which softening of the sealant begins, so as to prevent a bubble in the sealant [form growing] from increasing in size.

24. (ONCE AMENDED) The [manufacturing] method of manufacturing a gas discharge display panel as recited in 15, [wherein] further comprising connecting a conduction

pipe [is connected] to the through-hole, and connecting a seal head, available to exhaust the discharge space, [is connected] to the conduction pipe after the sealant is solidified and cooled [so as to introduce] and introducing a discharge gas through the conduction pipe and seal head into the discharge space.

25. (ONCE AMENDED) The [manufacturing] method of manufacturing a gas discharge display panel as recited in 20, [wherein] further comprising using a heater provided in the seal-head [having a heater] to heat and melt [the conduction pipe melts] a part of the conduction pipe [by heating] after introducing [of] the discharge gas into the discharge space via the conduction pipe, so as to seal the discharge space.

26. (ONCE AMENDED) The [manufacturing] method of manufacturing a gas discharge display panel as recited in 25, wherein [a] an ambient pressure [in a ambient of] on an exterior of the pair of [the] substrates [or] and the part of the conduction pipe to be melted is raised to a higher pressure than that in the discharge space when the part of the conduction pipe is melted.

Please ADD the following claims:

27. (NEW) A method of manufacturing a plasma display panel comprising a pair of substrates having a discharge space therebetween and sealed with a sealant, comprising:

forming the sealant in a frame-shape and disposing same so as to extend between the pair of substrates;

exhausting the discharge space through a conduction pipe, secured to at least one of the substrates and communicating with the discharge space;

heating and thereby melting the sealant while exhausting the discharge space through the conduction pipe so as to lower the internal pressure within the discharge space, relative to an external pressure on the exterior of the substrates, such that the sealant, while melting, is compressed by the external pressure on the pair of substrates, sealing the pair of substrates.

28. (NEW) The method of manufacturing a plasma display panel as recited in claim 27, further comprising:

after sealing the pair of substrates, heating the discharge space to a temperature lower than a melting point of the sealant and exhausting the interior of the discharge space via the

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conduction pipe, so as to remove impurities from within the discharge space and thereby purify same; and

filling the purified discharge space with a discharge gas via the conduction pipe.

29. (NEW) The method of manufacturing a plasma display panel as recited in claim 27, wherein a leak clearance is formed between the frame-shaped sealant and at least one of the pair of substrates and the exhausting of the discharge space is performed through both the conduction pipe and the leak clearance.

30. (NEW) A method of manufacturing a gas discharge panel comprising a pair of substrates opposed to each other, one of the substrates having a plurality of electrodes on a inner surface thereof so as to produce a discharge with adjacent electrodes and the other of the substrates having on an inner surface thereof fluorescent materials of a plurality of different colors for emitting fluorescences stimulated by the discharges and a plurality of separator walls formed in a predetermined pattern separating said fluorescent materials, comprising:

forming a seal glass layer along a periphery of the other substrate, of a height greater than a height of said separator walls;

positioning the pair of substrates, in opposed relationship and separated by a discharge space of a predetermined interval therebetween, in a vacuum-heating furnace;

exhausting the discharge space between the pair of opposed substrates via a leak clearance between the seal glass layer and the substrate until said seal glass layer begins melting, to produce a low pressure therein relative to an exterior pressure on the substrates; and

heating said seal glass layer until said seal glass layer melts while maintaining the low pressure in the discharge space by said exhausting.

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